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ABSTRACT

Hunters in 20 States of the Central and Mississippi Flyways participated in an experimental 9-day teal hunting season in September 1965. During this special season, hunters were required to obtain a free permit and could shoot four teal a day (blue-winged teal, green-winged teal, and cinnamon teal, singly or in the aggregate) and have eight in possession. Data were obtained by means of a mail questionnaire survey, a teal wing collection survey, and a hunter performance (spy-blind) survey. A total of 201,972 hunting permits was issued, 49,359 in the Central Flyway and 152,613 in the Mississippi Flyway. Of the applicants who obtained permits, 55 percent hunted. Hunters bagged 448,060 ducks, including 404,710 blue-winged teal and 39,610 green-winged teal. The harvest of illegal ducks, not recognized as such, was 3,600 (from the wing collection), but the actual illegal kill, based on the hunter performance survey, was estimated to be 33,736. The species most prevalent in the illegal kill were wood ducks (13,000) and mallards (7,088). Percentages of cripples and unretrieved ducks revealed by the hunter performance survey were added to these totals, which together with a projected kill for the regular season, gave a total hunting loss by species. These totals were converted to percentages of the fall populations and compared with proportions of the populations killed in previous years. These data suggest that the experimental teal season in 1965 provided 111,085 hunters 257,180 days of recreation without adversely affecting the continental population of any waterfowl species. Additional data are needed, perhaps from three special teal seasons, in order to establish whether the bagged ducks add to or reduce nonhunting mortality for the teal species involved.

INTRODUCTION AND BACKGROUND

Interest in a special hunting season on teal was formally expressed in 1957 when the Mississippi Flyway Council proposed an experimental teal season for Louisiana. No immediate action was taken on this proposal, but interest in regulating harvest by species increased as duck populations decreased during the late 1950's and early 1960's. In the spring of 1962, the Regulations Committee of the Technical Section, Mississippi Flyway Council, met with delegates from the Atlantic and Central Flyways at Oak Harbor, Ohio. The attendants discussed waterfowl "species management" and defined the species and/or areas which might be used to provide additional hunting recreation.

Waterfowl biologists attending this meeting concluded that blue-winged teal was the best species for the first attempts at intensive species management. The blue-winged teal was chosen because: (1) it seemed to have a low rate of hunting kill and (2) it migrated early allowing it to escape gunning pressure in most of the United States, and tending to isolate it from other species of ducks in the autumn. Green-winged teal were included with bluewings because biologists thought that most hunters would not be able to distinguish between these two species of similar size. Moreover, the effect of the early shooting on the greenwing was expected to be small because, being a later migrant, it would not be present in large numbers to be harvested.

The Committee report was presented to the Technical Sections of the Central and Mississippi Flyways and subsequently to the Flyway Councils. In August 1963, the Mississippi Flyway Council moved that an early blue-winged teal season be planned and that the mechanics for this season be set up for the fall of 1964. However, the Regulations Committee of the Council concluded that the necessary data gathering procedures for the experimental season could not be set up in time for 1964. They recommended that an experimental teal season be conducted in the Mississippi Flyway in 1965. This was acceptable to the States in the Mississippi Flyway as well as to the Bureau of Sport Fisheries and Wildlife. During this period, the Central Flyway Technical Section and Council had gone through similar stages of preparation and the Central Flyway was included in the experimental September teal hunting season to be held in 1965. This report presents and discusses data collected during the 1965 September season so that they may be considered in the continuance of the experiment in September 1966.

HUNTING REGULATIONS

Federal Framework

The Bureau of Sport Fisheries and Wildlife established the following conditions for the experimental September teal hunting season.

Regulations Framework

(a) Within the outside dates of September 1 through September 30, 1965, each State or portion of State in the Mississippi and Central Flyways may select an open season of 9 consecutive days with daily shooting hours from sunrise until sunset and a daily bag limit of 4 and a possession limit of 8 blue-winged, green-winged, and cinnamon teal, singly or in the aggregate of these species.

(b) All hunting must be conducted in accordance with Federal laws and regulations governing the hunting of migratory game birds, and each hunter must have on his person while hunting a valid special teal hunting permit and, if 16 years of age or older, a valid Federal duck stamp.

(c) Federal regulations will prescribe open seasons on a State-wide basis. Each State will determine any area within the State in which they do not desire an open season and close such area by State regulation.

(d) State selections of specific open season dates within the above framework must be received by the Bureau not later than May 20, 1965.

Special Teal Hunting Permits

(a) The Bureau will furnish each participating State with a supply of serially numbered, franked permits on or before June 1, 1965.

(b) Each State will publicize its season, setting forth the area open, the requirement for a special permit, and the dates within which written applications for permits will be accepted. A cutoff date for accepting applications will be established at least 30 days prior to the opening day of the selected season.

(c) Permits will be in the form of a double postcard with the serial number appearing on both halves. The carbon half will be torn off and forwarded to the Bureau.

State Participation and Restrictions

The States which adopted an early teal hunting season and the hunting dates which they selected are listed in table 1. Montana in the Central Flyway and Wisconsin, Tennessee, and Alabama in the Mississippi Flyway did not permit teal hunting during the September period offered by the Bureau. Several other States, although allowing teal hunting during the specified period, imposed restrictions in addition to Federal regulations. These States were North Dakota, Colorado, New Mexico, Minnesota, and Michigan.

PROCEDURES

Mail Questionnaire Survey

Providing a carbon copy of each teal permit created an essentially complete file of names and addresses of permittees and made available, through simple card counts, accurate data on the size of the hunting universe to be sampled and on its distribution both among and within States. It also facilitated the selection of a systematic sample of hunters for the mail questionnaire survey. This system was followed throughout except that persons previously designated to participate in the wing collection survey (discussed below) were omitted from the questionnaire survey whenever other persons were available to replace them. This avoided the confusion which sometimes results when a person is contacted twice on the same subject and concludes that some mistake has been made. In those few States where less than 1,800 permits were issued and inclusion of hunters in both surveys could not be avoided, a note of explanation was sent with each questionnaire.

Consideration of both the administrative aspects and the requirements of statistical reliability in this survey led to the conclusion that 20,000 hunters would be selected to receive a questionnaire; 1,000 from each State taking part in the experiment. The surplus questionnaires from States which issued less than 1,000 permits were assigned to the States which issued the largest numbers. Numbers of questionnaires sent to hunters in the various States are shown in table 1.

The questionnaire was similar to that used in the Bureau's Annual Kill Survey. It consisted of two IBM cards, one addressed to the hunter requesting that he fill out the questionnaire and giving detailed instructions for doing so, the other a postage prepaid card containing the questions to be answered. The hunter was asked the number of days he had hunted during the special season, the number of teal he had bagged, and the number he had knocked down but had not retrieved. He was then asked to indicate the dates on which he had gone hunting and the number of teal he had taken each day. He was also asked for information about

any banded ducks he had taken. This was followed by a question asking whether he had purchased a duck stamp for waterfowl hunting the previous year (1964). A final question asked if he would be interested in participating in a similar special teal season next year. Space was provided for additional comments by the hunter.

Questionnaire mailings were timed to reach the hunters at the end of the season in each State. Those persons who had not responded after 3 weeks were sent a follow-up inquiry. Approximately 2 months after the closing date of the final season, the questionnaires were processed for analysis.

For the collection and analysis of data in the Bureau's Annual Waterfowl Kill Survey, most States have been divided into geographic zones along county lines. The same stratification system was applied in this analysis so that the distribution of hunting activity and success within States could be examined. Analysis of the data revealed that the samples were proportionately distributed within States and there was little to be gained by within-State weighting. Therefore, the estimated means, variances and totals for hunter-days, teal bagged, teal lost, and other observed values by geographic zones were combined to produce State estimates; State figures were combined into flyway and total estimates.

For those few questionnaires which were only partly filled out, the missing information (days, duck bag, etc.) was treated as zero; i.e., these hunters were assumed to have been inactive or unsuccessful, depending on which item was missing. As a result, the estimates are slightly lower (less than 1 percent) than they would be had this assumption not been made.

We reasoned that hunters asked to cooperate in questionnaire and duck wing surveys would not report ducks they recognized as illegally killed (ducks other than teal). Thus, the data received in these surveys included those ducks taken which were thought to be teal. The number which actually were teal was therefore estimated by applying the species composition figures from the wing collection survey to the total bag estimates.

Estimates made from the special teal season mail questionnaire are not adjusted for response biases that may have occurred as are the estimates made from the regular hunting season questionnaire. However, we feel that the potential for response bias (exaggerated reports) in reports on such short special hunting seasons is considerably less than that on the regular hunting season questionnaire (J. R. Grieb, A. D. Geis and R. Buller, Administrative Report No. 79, Progress Report - Experimental Hunting Season in the San Luis Valley, Colorado - 1964).

Because the response rate was higher on the special teal season than on regular season questionnaires, the potential for nonresponse bias (resulting from the tendency of successful hunters to return questionnaires at a higher rate than unsuccessful hunters) was smaller.

Wing Collection Survey

The teal wing collection survey was designed primarily to measure the species, age, and sex composition of the teal kill. Secondarily, it was intended to gather information on hunter response, not only for use as indexes of total kill and hunter success, but also to aid in the planning of future surveys of this type.

Although we did not know what the response rate would be, we believed that a sample of 800 permittees from each State would insure an adequate number of wings to determine the characteristics of the kill during the season. Each State was furnished approximately 800 packets containing 10 envelopes each (the actual numbers of packets issued are shown in table 1). Each State issued 1 packet approximately 1 week before the season to each of 800 hunters they had selected by systematically sampling their list of permittees. The packet number was recorded on the permit and carbon copies of all permits were forwarded to the Migratory Bird Populations Station.

An explanatory letter, accompanying each envelope packet, mentioned that this was a special teal season but instructed hunters to send us a wing from each duck that he shot during this special season. Instructions on the wing envelopes did not mention teal. All the wing envelopes were addressed to the State Game Farm, Poynette, Wisconsin. There the wings were kept frozen until examined by State and Federal biologists. Data recorded on the envelopes were transferred to IBM cards and processed by machine at the Migratory Bird Populations Station.

The distribution of samples of both hunters and wings turned out to be proportional within States so no in-State weighting was necessary. The number of permits issued, however, varied greatly among States and samples of 800 constituted different proportions of State totals. Consequently, to obtain flyway ratios, data from each State were weighted by dividing the number of wings received into the reported total kill for that State. The resultant value was the number of bagged birds represented by each wing.

Hunter Performance Survey

Hunter behavior in the field is one of the most important factors limiting the practicality of a September teal season. It was necessary, therefore, to determine: (1) the extent that hunters shot species other than teal and the magnitude of the kill of illegal species, (2) the crippling loss on teal, and (3) the degree to which hunters abide

by the regulations in general. To evaluate hunter performance, the Bureau requested that each participating State complete a minimum of 30 hunter performance (spy-blind) observations. In States where more than 4,000 permits were issued, the Bureau asked for at least 50 observations. These observations were to be made without the hunter's knowledge and, preferably, should include entire hunts. However, we recognized that many, if not most, of the observations would probably include only a part of a hunt. The observer was to record what he saw on a form supplied by the Migratory Bird Populations Station which asked for data on: location, time, number of hunters, type of area, use of dogs, awareness of observation by the hunter and other questions about hunter performance. Data on the hunter's (or hunters') action when flights of birds passed within his range were to be recorded by species and numbers of birds in the flights. These actions included, for example, whether the hunter fired, numbers of shots fired and whether birds were hit and retrieved, hit and not retrieved, or missed. The form also provided space to record bag check data when a complete hunt was observed. Data obtained from the hunter performance survey were analyzed for each State using, for kill data, only those performance cards which recorded that the subject hunter was unaware of the observer's attention. Numbers of hunters observed and total time of observation during the experimental season are shown in table 1 for each State.

Banding

Banding and recovery data are needed to provide information on kill rates, mortality rates, and differences in vulnerability to the gun of the various age and sex groups of teal before, during, and after the experimental hunting seasons. Summer banding of blue-winged teal locals and molting adults and preseason banding of flying teals, both immatures and adults, were given special emphasis in 1963 throughout southern Canada and the North Central States. This program has been conducted on a fairly large scale since then. During the years when experimental seasons were planned, banding was to be done immediately after the season as well as just before it. Banding during these periods will be continued with the continuance of experimental hunting seasons. The emphasis of this banding effort has been on blue-winged teal but some greenwings have been banded during drive-trapping and preseason banding operations in southern Canada and the Northern United States. This report does not contain an analysis of these data because all recoveries have not been reported; however, further reports on the experimental September teal hunting seasons will include analyses of banding and recovery data as they become available.

RESULTS

The total number of valid permits issued for the special season has been set at 201,972 (see table 1 for State and flyway totals). This is almost one-fourth of the duck stamp purchasers estimated for these

20 States during the previous (1964-65) regular hunting season. The special permit total, based largely on information supplied by the States, is not exact for several reasons. Spot checks of the counts supplied by each State revealed errors, which in a few instances involved several hundred permits. Additional checks were run and corrections made wherever errors were detected and we believe that most miscounts have been eliminated. Secondly, small numbers of duplicate applications were received and processed by most States. Consequently, the total (201,972) probably includes several hundred duplicate permits. Finally, because of incomplete or incorrect addresses, not all permits could be delivered to the individuals requesting them. Because records of undeliverable permits were fairly complete, they could be excluded from the State totals, leaving less than 100, it is believed, in the final totals.

Questionnaires were sent to 19,830 permit holders (table 1). Response rates ranged from 62 percent (Louisiana) to 85 percent (Colorado). Response rates for the Mississippi and Central Flyways were 76 percent and 79 percent, respectively, and averaged 77 percent (15,280 questionnaires). These response rates are substantially higher than those usually achieved in the Bureau's Annual Waterfowl Kill Survey of the regular waterfowl season (about 63 percent for the Mississippi Flyway and 65 percent for the Central Flyway).

Packets of wing envelopes were sent to 15,625 hunters (table 1), and 21.2 percent (3,314) responded. The percentage response by States ranged from 54.9 (South Dakota) to 3.5 (Mississippi). In general, response rates were highest in the Northern Prairie States and lowest in the South. Response to the wing collection survey was 25.7 percent of the hunters contacted in the Central Flyway and 17.7 of those contacted in the Mississippi Flyway.

Participation and Hunting Activity

Numbers of Hunters

Table 2 shows the numbers of applicants (persons issued permits), the percent of applicants who went hunting (hunters) and the percent of hunters who killed ducks (successful hunters). These data suggest a general decrease in hunter participation and success, in both flyways, from north to south. Fifty-five percent of the applicants went hunting. The percentage of applicants who hunted in the Central and Mississippi Flyways were 56 and 54, respectively.

Hunting Effort

The average number of days of hunting per applicant and per hunter, and the total days of hunting for each State are presented in table 3.

In most States, the average hunter went afield two or three times during the experimental season. In Minnesota, where the special season may prove to have a unique effect on the teal population, hunters amassed a total effort of 68,360 days. However, the season in that State was only 3 days long so hunters averaged only 1.85 days of hunting.

Table 5 shows the distribution of hunting activity within the season. Most hunting was on Saturdays and Sundays in all States except Michigan (opening day on Thursday), and Indiana and Ohio (no Sunday hunting). In other words, hunting effort was greatest on weekends and opening day, or both. In the Central Flyway, the third day (usually a Monday) showed somewhat higher hunting pressure than other week days. In general, there was an even distribution of reduced hunting effort throughout the week and a moderate resurgence of hunting on the second weekend if the season encompassed two of them.

Hunting Kill

Total Retrieved Kill or Harvest

The total retrieved kill of ducks during the experimental September teal season was estimated from the mail questionnaire survey to be 448,060 (table 3). In the Central Flyway, the bag was 126,810 and in the Mississippi Flyway, 321,250. South Dakota hunters made the largest harvest in the Central Flyway with 46,690 ducks; the greatest number of birds in either flyway (151,360) was killed in Minnesota.

Hunting Success

Seventy percent of the hunters were successful - 66 percent in the Central Flyway and 71 percent in the Mississippi Flyway. In the Mississippi Flyway, 81 percent of the hunters were successful in Minnesota, while in Mississippi and Kentucky only 29 and 30 percent, respectively, of the hunters were successful. The seemingly low response rate to the wing collection survey was due largely to the small proportion of the permittees that killed teal.

Average seasonal duck bag per participant (table 3) was 2.6 in the Central Flyway, 2.1 in the Mississippi Flyway and 2.2 for both. Per hunter, the average duck bag was 4.6 in the Central Flyway, 3.9 in the Mississippi Flyway, and 4.1 together.

Daily hunting success in the various States participating in the teal season is shown in table 4. In most States, about half the hunting trips were successful. In terms of successful hunting trips, there was exceptional success in the Dakotas and Minnesota; exceptional failure in Kentucky and Mississippi. Also the States differed substantially in the frequency with which hunters bagged the limit.

The proportion of the kill in each State that consisted of the fourth duck in the bag is significant. It not only indicates the extent to which a one-duck reduction in the daily bag limit would have reduced the kill, but also the success that was experienced once one duck was bagged. Compare, for example, Texas and North Dakota. In Texas, there was a much higher incidence of unsuccessful hunts than in North Dakota; however, once Texas hunters killed a duck they apparently attained the limit as often as North Dakota hunters, since the fourth duck made up as high a portion of the total kill in Texas as it did in North Dakota.

The average kill per day also is shown in table 4. Hunter success per day was far greater in North and South Dakota than elsewhere in the Central Flyway. In the Mississippi Flyway, hunting success in Minnesota and Louisiana was substantially greater than in other States in the flyway. The data in table 4 show that much of the difference among States in average hunting success depended upon hunters finding the ducks. Once they found the ducks, hunters in the different States were more uniformly successful. Note that the proportion of the kill consisting of the fourth duck varied less than the average kill per day.

Distribution of the Harvest Throughout the Season

The number of ducks bagged each day of the season (table 6) varies directly with the hunter effort. That is, the bulk of the kill was taken on weekends or, in the case of Michigan, Indiana and Ohio, on opening days and weekends when the hunting effort was concentrated. Although 35 to 60 percent of the kill was taken during the first 2 days of the hunting season in most areas, a significant portion of the harvest (17 to 35 percent) was taken on the last 2 days. Daily percentages of the kill during mid-week days varied from 2 to 12 percent.

Hunting Success Throughout the Season

Examination of the average kill of ducks per active hunter on each day of the season (table 7) suggests that, while greatest degree of success was usually on the first day of the season, hunting success held up fairly well during the week and even on the last weekend. In some cases, success appeared to be highest on week days.

Harvest of Blue-winged Teal

A total of 404,710 blue-winged teal, which comprised 90 percent of the total bag of ducks, was shot and retrieved in the 2 flyways (table 8). In the Central Flyway, 110,430 blue-winged teal comprised 87 percent of the harvest. In the Mississippi Flyway, 294,280 blue-winged teal, 92 percent of the total flyway duck bag, were taken.

Harvest of Green-winged Teal

A grand total of 39,610 green-winged teal, comprising 9 percent of the total duck bag, was shot and retrieved in the 2 flyways (table 8). In the Central Flyway, 15,520 green-winged teal comprised 12 percent of the total flyway duck bag. In the Mississippi Flyway, 24,090 green-winged teal, 7 percent of the flyway duck bag, were taken.

Harvest of Cinnamon Teal

We had no way of estimating the harvest of cinnamon teal because, at this time, there is no way of distinguishing their wings from those of blue-winged teal. However, the kill of cinnamon teal was probably quite small since only one (bagged in Brazoria County, Texas) was recorded during the hunter performance survey.

Harvest of Illegal Ducks

As mentioned in the section on procedures, we assumed that hunters who sent in wings from illegal ducks thought they were legal. Thus, it was logical to assume that the mail questionnaire estimates also included birds that were illegal but believed by the hunters to be teal, and that the estimated retrieved kill of ducks included illegal birds as well as teal (table 8). We realize that the species composition of the estimated retrieved kill does not accurately reflect the species composition of all ducks killed. Many hunters undoubtedly recognized most illegal (non-teal) birds after killing them and did not send the wings. Consequently, the illegal kill determined from the mail questionnaire and wing collection surveys is certainly minimal and inaccurately represents the species composition of the illegal kill. Only 192 non-teal wings were received; 153 of these were from wood ducks. The other wings were from various species of dabbling ducks, one ring-necked duck, and a pied-billed grebe. Data from the hunter performance survey, presented later in this report, must serve to provide a better estimate of the total illegal kill and its species composition.

Retrieved kill estimates (table 8) indicate that about 2,690 wood ducks and 910 illegal birds of other species were shot, retrieved, and taken home (but probably not recognized as illegal species) during the experimental September teal season. In the Central Flyway, 380 wood ducks and 450 other illegal species were taken, while in the Mississippi Flyway, 2,310 wood ducks and 460 other illegal ducks were bagged. The proportions of the harvest that were illegal, as indicated by the wing collection, appeared to be highest in the southern half of the Mississippi Flyway but the largest illegal bag for any one State was made in Minnesota.

Age and Sex Characteristics of the Harvest

Age and sex ratios in the teal harvest reveal many characteristics of teal populations but are influenced by the susceptibility of different age and sex groups to gunning pressure and the relative availability of each group to hunters. These data will be reviewed again once a measure of comparative vulnerability to shooting for each age and sex group becomes available from banding.

Age Ratios of Blue-winged Teal. Age ratios (immatures per adult) in the harvest are summarized in table 9. In general, ratios were highest in the North and declined gradually southward. The weighted immature:adult ratio of bluewings was higher in the Central Flyway (3.1) than in the Mississippi Flyway (2.3).

Age Ratios of Green-winged Teal. The sample of green-winged teal was much smaller than that of bluewings and does not show the north-south gradation of age ratios (table 9). Age ratios are not shown for the Southern States of the Mississippi Flyway because sample sizes were too small. Flyway weighted age ratios were substantially lower for green-winged teal than for blue-winged teal and, unlike those for blue-winged teal, were nearly the same in each flyway.

Sex Ratios of Immature Blue-winged Teal. Sex ratios of immatures killed in the Central Flyway were 1.25, favoring males (table 10). There was little variation among States, excepting the ratio in Texas which was 2.0 males per female.

Ratios from States in the northern part of the Mississippi Flyway favored immature females, while the reverse was true in the southern half of the flyway. There is, therefore, a slight suggestion that some immature males may migrate before the immature females. The Mississippi Flyway weighted ratio was 1.00 male per female in the kill.

Sex Ratios of Immature Green-winged Teal. Sex ratios of immature green-winged teal in the harvest varied slightly from State to State (table 10). Samples of immature green-winged teal wings were small in most States. There was a tendency for samples from the northern tier of States to contain more females than males, while males were slightly more abundant in the harvest of the remaining States. The flyway weighted sex ratios of immature green-winged teal suggest that more males than females were bagged in the Central Flyway (1.22 males per female), but that slightly more females than males in the Mississippi Flyway (0.92 males per female).

Sex Ratios of Adult Blue-winged Teal. Sex ratios of adult blue-winged teal bagged in the Central Flyway generally favored females. However, in Nebraska and Texas, males outnumbered females by 1.4:1 and

9.3:1, respectively, (table 11). The low age ratio of bluewings in Texas (table 9) and the extremely unbalanced adult sex ratio suggest that an early migration of adult males had arrived from the north and that other age and sex groups were less available. Largely because of the ratio in the Texas sample, the flyway weighted adult sex ratio favored males (1.32:1).

Much less variability was noted in the Mississippi Flyway where the weighted sex ratio was 1.11 males per female. Only three States recorded adult sex ratios that favored females. Louisiana, which selected a late season (September 18-26), recorded an adult sex ratio of 2.5 males per female in contrast to the much more unbalanced ratio found in Texas (9.3:1) which selected an earlier season (September 4-12). This suggests that most of the early migration of adult males had passed Louisiana before their season opened.

Sex Ratios of Adult Green-winged Teal. Samples of adult green-winged teal wings were meagre in all States (table 11). Except for Minnesota, States tended to show ratios distorted in favor of males. Extremely high proportions of males were suggested in both Louisiana and Texas. All 14 wings from adults received from Louisiana were males, while 20 of 21 adults taken in Texas were males suggesting an early migration of adult males to these areas.

Incidence of Soft Primaries in Blue-winged Teal. During the course of wing evaluation, many wings of blue-winged teal were noted to have soft primaries and some represented birds that were obviously incapable of flight when hunted. The largest number of such birds came from the northern portions of both the Central and Mississippi Flyways (table 12). Teal wings with soft primaries were two to three times more common in the Central than in the Mississippi Flyway for all age and sex groups. This probably reflects earlier hunting seasons and perhaps the higher proportion of teal nesting in the northern part of the Central Flyway.

In both flyways, adult males showed the lowest incidence of soft primaries among age and sex groups. The highest percentages were noted in the Northern States but a few birds with soft primaries were taken in Southern States. Adult females are known to molt later than adult males because they are caring for broods while many of the males are molting. Thus, the differences between adult males and females were expected.

Soft primaries occurred approximately equally on the wings of both sexes of immatures (males: 18.2 percent in the Central Flyway and 7.6 percent in the Mississippi; females: 21.5 percent and 6.8 percent, respectively). Nowhere did the rate approach that for adult females, although it was higher than that for adult males. Most of the immatures with soft primaries were shot in the Northern Prairie States, although

some were reported from all States except Ohio and Arkansas. This suggests that the immatures begin their southward migration very soon after they are capable of flight. Smart (J. Wildl. Mgmt., 29(3): 533-536) has shown that late hatched redheads are capable of short flights when they have as few as six primaries that are clear and hard and that the tenth primary is clear and hard approximately 2 weeks later. Thus, the teal with soft primaries had probably been capable of flight little longer than 2 weeks.

Unretrieved Hunting Kill or Crippling Loss

Data on ducks shot but not retrieved during the September experimental teal season were available from both the mail questionnaire and the hunter performance surveys. These data are presented in table 13 as rates of crippling loss (birds lost per bird bagged). The data from the mail questionnaire survey represent all ducks and, as mentioned earlier in this report, some of these birds were not teal. Data from the hunter performance survey were for teal only and we used observations on hunters who were aware they were being watched as well as those on hunters who did not know they were being observed.

Rates of crippling loss from the mail questionnaire survey suggest that 0.19 ducks were lost for each one bagged during the experimental September season. Flyway rates of crippling loss were 0.17 and 0.20 ducks lost per duck bagged in the Central and Mississippi Flyways, respectively. Crippling loss rates varied considerably among States; some of this variation is undoubtedly real, but a part may be due to sampling error especially in States where few birds were taken.

Data on crippling loss from the hunter performance survey were adequate from only about one-half of the States. Among these States crippling loss rates varied considerably as they did when calculated from mail questionnaire survey data. Generally, the data from the hunter performance survey suggest a slightly higher crippling loss than the data from the mail questionnaire survey but still about one bird lost for every five bagged.

Total Hunting Kill of Teals

The total hunting kill of teal, all deaths caused by hunting, included both retrieved kill (harvest) and unretrieved kill (cripples) and was determined by adding an estimated number of cripples to the harvest. To estimate the numbers of cripples, we used crippling loss rates determined from the mail questionnaire survey because numbers of hunter performance observations were inadequate for several States. However, we concluded that our estimates were minimal because the observed crippling loss from States where there were adequate numbers of observations tended to be higher than that reported on the mail

questionnaires. We further assumed that the estimates of crippling loss were applicable for both blue-winged teal and green-winged teal and adjusted the harvest estimates for these species as shown in table 13.

Blue-winged Teal. The total hunting kill of blue-winged teal was 483,864 (table 13). The kill of bluewings in the Central Flyway was 129,008 while that in the Mississippi Flyway was 354,856. The rank among States in the size of the kill did not change from that of the retrieved harvest.

Green-winged Teal. The total kill of green-winged teal during the experimental September teal season was 46,789; 18,034 were killed in the Central Flyway and 28,755 in the Mississippi Flyway. As with blue-winged teal, Minnesota had the highest kill with 9,601 birds.

Total Hunting Kill of Illegal Ducks

The ratio of illegal to legal kill recorded by hunter performance observers was used to expand the total legal kill (table 13) to total kill, legal and illegal (table 14). The hunter performance sample was restricted by the exclusion of cards which showed that the hunter was aware of being observed and cards which indicated uncertainty as to whether or not the hunter was aware of being observed. Very good samples were obtained from Minnesota and Iowa. Samples were entirely absent from Kentucky and Arkansas and very low from New Mexico, Oklahoma, Wyoming, and Mississippi. Data from adjoining States were used to estimate illegal kill for those States with little or no hunter performance data. Fortunately, those States which lacked hunter performance samples were also (with the exception of Indiana) lowest in total kill, so that the effect of these insufficient samples on flyway and national estimates is minimal.

The proportion of the total kill that was illegal was greater in the Central Flyway (8.3 percent) than in the Mississippi Flyway (5.6 percent).

In the Mississippi Flyway, Iowa had the highest proportionate illegal kill (13.4 percent). The estimated proportion of total kill that was illegal for both flyways combined was 6.4 percent.

The illegal kill estimates by States do not necessarily indicate the hunter's ability or willingness to distinguish between species. Most often, it is an indication of the availability of illegal birds to be shot.

The total estimate of illegal ducks killed during the experimental September teal season was 33,736; 12,174 in the Central Flyway and 21,562 in the Mississippi (table 14).

Of illegal species killed, there were more wood ducks (13,000) than any other single species (table 15). The kill of mallards (7,088) was second to that of wood ducks followed by mottled ducks (3,103), widgeons (2,649), pintails (2,056), shovelers (1,571), and redheads (1,008). Much of the State to State variation in the proportions of illegal ducks killed relates to the small numbers of hunter observations made in about half the States (sampling error). This is shown especially in the species composition of the kill of illegal ducks; e.g., we obtained no estimate of the wood duck kill in several States of the southern Mississippi Flyway but relatively large kills of wood ducks were estimated for the Central Flyway States of Nebraska and Kansas. Consequently, estimates for individual States are frequently in error, but we think the pooled totals are reasonable.

Hunter Opinion

On the regular waterfowl questionnaire for the 1964-65 hunting season, the question was asked: "if allowed, would you apply for a free permit to participate in a teal season in September 1965?" The answers to this question represent a random sample of all waterfowl hunters; their responses were tabulated as the percentage "yes" answers to the total in each State (table 16). A total of 73 percent of all the Central and Mississippi Flyway hunters responded "yes" to the above question.

Table 16 also presents the ratio of 1965 teal permits issued to 1964 duck stamp sales. Although this comparison does not include the first-year hunters of 1965, it approximates the proportion of duck hunters who took advantage of the season. Approximately one-fourth of all the waterfowl hunters in the two flyways received teal permits. Highest ratios of permits issued to duck stamp sales were in the States of Louisiana (0.481), Iowa (0.452), Minnesota (0.428), and Kansas (0.406).

A similar question, "if a special teal season, similar to the one just ended, is set again next year, would you wish to participate?" was asked on the September 1965 teal season questionnaire. The response again was tabulated as the percentage of "yes" answers (table 13). A grand total of 87 percent of all the teal season permit holders were in favor of another special season. It should be remembered that this was a special sample of hunters, those who applied for and received a permit, and was not a random sample of all waterfowl hunters who hunt during the regular season.

DISCUSSION

In this report, we have presented data which were obtained from surveys conducted either during or immediately after the September experimental teal season. Additional data for evaluating the effect of the experimental season on populations of blue-winged and green-winged teal will be obtained from the waterfowl kill and duck wing collection surveys following the regular hunting season, from band recovery data and from breeding population surveys. Unfortunately, none of these data will be available for use until about June 1, 1966.

Preparation of this report was prompted because a decision on the continuance of the experimental season in September 1966 must be made before June 1. It seems appropriate, therefore, to review kill survey data during past years (table 17) and to project the probable 1965-66 total hunting kill from them. The total kill (retrieved and unretrieved) for the 1965-66 hunting season is estimated to be 300,000 for bluewings and 800,000 for greenwings.

The total kill of blue-winged teal (483,864) during the experimental September season was intermediate between the average kills of bluewings during the 1955-59 period and the 1960-64 period. The kill of bluewings during the experimental September season was less than two-thirds of the kill in the Central and Mississippi Flyways during 1955-59. A total estimated kill for the special September season plus the kill in the regular 1965-66 waterfowl hunting season may be about 700,000 or 800,000 blue-winged teal. This would be a total kill somewhat higher than the average during 1955-59.

More important than the absolute kill, is the rate of kill effected by the experimental September season. During the late 1950's, approximately 5 percent of the average fall population of blue-winged teal was killed by hunters in the United States. During the 1960's, the proportion of average fall populations killed by hunters in the United States was markedly less, perhaps around 2 percent. During the experimental September teal hunting season, the rate of kill on the estimated fall population of bluewings was about 4 percent; still somewhat lower than the rate of kill during the 1955-59 period. For the total estimated kill given in the previous paragraph, combining the experimental and the regular 1965-66 seasons, the total rate of hunting kill is around 7 percent, perhaps 1 or 2 percent higher than the rate during the 1950's. Although this additional rate of kill was imposed on birds only in the Central and Mississippi Flyways, these flyways are used in the fall by the majority of blue-winged teal from as far west as Alberta (Calvin J. Lensink, Distribution of Recoveries from Bandings of Ducklings, Special Scientific Report--Wildlife No. 89).

With respect to the local effects of the special teal season, the greatest potential danger is in the North Central States where the birds breed. In the tri-state area of North Dakota, South Dakota and Minnesota, the total kill of bluewings during the experimental season was 232,906. In this same area, we estimated a 1964 fall flight of 3,838,700 birds. Thus, the total kill in these three States during the September season represents 5 to 6 percent of the fall flight. The effect of the large kill on local populations in Minnesota was probably greater than elsewhere, but, because these birds were probably mixed with migrants from other areas, it is difficult to assess the degree of this effect until data from breeding population surveys and banding are available.

The total rate of hunting kill, or percent of the population dying as a direct result of hunting, should also be compared to estimated annual mortality rates to determine the proportion of total annual deaths that were caused by hunting in 1965-66. Average annual mortality rates for blue-winged teal have been presented by R. I. Smith and A. D. Geis (Blue-winged Teal Band Recovery and Mortality Rates, Administrative Report No. 18) and F. C. Bellrose and Elizabeth B. Chase (Population Losses in the Mallard, Black Duck, and Blue-winged Teal, Illinois Natural History Survey Biological Notes No. 22). Smith and Geis estimated average annual mortality rates for adult males banded during the summer in the Prairie Provinces at about 42 percent; those of adult males in the Dakotas and Minnesota at about 49 percent. For adult females, the average annual mortality rate was about 53 percent for Prairie Province birds and about 58 percent for birds from the Dakotas and Minnesota. They estimated average annual mortality rates for immature blue-winged teal at about 72 percent for Prairie Province birds and 78 percent for those reared in the Dakotas and Minnesota. Bellrose and Chase provided an estimate of average annual mortality among blue-winged teal of 57 percent (all age and sex groups combined). When these average annual mortality rates are compared with the rate of total hunting kill (7 percent) during the experimental season and during the combined hunting seasons in 1965-66, it is apparent that hunting in the United States accounted for only a small percent of the total deaths.

The kill of green-winged teal during the 1965 experimental September teal hunting season was very low in relation to the average kill taken in previous years. In fact, it was less than a third the size of the average 1960-64 Central Flyway kill. During the 1950's, an estimated kill rate on green-winged teal was about 16 percent and that during the 1960's, when quite restrictive hunting regulations were in effect, it was about 11 percent. Considered continent-wide, the special season kill of greenwings was only about 1 percent of the estimated 1965 fall flight. The estimate of kill during the 1965-66 regular waterfowl hunting season added to the kill taken during the

experimental September season suggests a rate of kill of about 15 percent or about the same magnitude as that during the 1950's. Thus, the additional kill effected by the experimental September teal season on greenwings was considerably less than that on bluewings and will certainly have little measurable effect on the population of that species.

In "The Green-winged Teal (Anas carolinensis Gmelin): Its Distribution, Migration and Population Dynamics" (a Doctoral Thesis, Laval University, Quebec City, Quebec), Moisan estimated average annual mortality rates of green-winged teal in North America to be about 50 percent for adults, and 70 percent for immatures. Here again, it seems that all hunting in 1965-66 might account for only a small proportion of the total annual deaths.

The effect of the hunting kill during the experimental September teal hunting season was measurably less on most other species of ducks. The total estimated kill of wood ducks was about 13,000 birds. This estimate can be compared with an estimated total kill in the Central and Mississippi Flyways of about 400,000 birds during the 1964-65 hunting season or approximately 3 percent of the total kill of wood ducks taken during the 1964-65 regular duck hunting season. The kill of mottled ducks during the experimental September season was estimated at 3,103. These birds were taken in Texas and Louisiana and may represent the highest proportion of total populations of any of the kills of illegal birds during the experimental season. Even so, this kill was less than 5 percent of the 1964-65 harvest.

At this time, we cannot determine whether the additional kill of ducks increased total annual mortality or merely replaced a fraction of the mortality attributable to nonhunting causes. Data such as those presented in this report from two more September seasons with complementary data from regular seasons, banding, and breeding ground surveys, should allow evaluation of the effect of the experimental season on annual mortality in these ducks.

The September 1965 experimental teal season provided 111,085 hunters with 257,180 days of hunting recreation. Data obtained from this first experimental season, when viewed in relation to previous regular season kills, suggest that the continental population was not adversely affected for any waterfowl species. Additional experimental seasons should be conducted to test this and to measure more closely the effect of the special teal season on local populations.

Table 1.--State participation and survey effort in the experimental September teal hunting season, 1965

Area	Hunting season dates in September	Additional State restrictions	Permits issued	Mail survey sampling: Hunters sent mail questionnaires	Mail survey sampling: Hunters sent wing envelopes	Hunter observation effort: Number of hunters watched	Hunter observation effort: Total observation time (hours)
Central Flyway							
Montana	No season	-	-	-	-	-	-
North Dakota	4-12	Yes	1,714	1,004	800	207	62
South Dakota	4-12	No	7,100	1,000	796	211	141
Wyoming	4-12	No	587	588	587	8	14
Nebraska	4-12	No	6,995	1,009	800	141	110
Colorado	4-12	Yes	3,938	1,009	717	49	42
Kansas	11-19	No	11,275	1,001	800	82	85
New Mexico	18-26	Yes	810	809	800	11	18
Oklahoma	22-30	No	3,997	1,000	797	9	5
Texas	4-12	No	12,943	1,017	799	73	69
Total			49,359	8,437	6,896	791	546
Mississippi Flyway							
Minnesota	11-13	Yes	55,000	1,280	796	501	437
Wisconsin	No season	-	-	-	-	-	-
Michigan	16-24	Yes	7,287	1,000	750	182	223
Iowa	11-19	No	17,018	1,025	798	350	362
Illinois	18-26	No	9,061	1,005	802	72	52
Indiana	10-18	No	2,267	1,002	799	81	108
Ohio	17-25	No	2,294	1,000	798	98	150
Missouri	18-26	No	9,970	1,005	800	177	187
Kentucky	18-26	No	843	844	800	9	10
Tennessee	No season	-	-	-	-	-	-
Arkansas	18-26	No	5,226	1,000	790	2	4
Louisiana	18-26	No	41,415	1,232	797	108	79
Mississippi	18-26	No	2,232	1,000	799	20	23
Alabama	No season	-	-	-	-	-	-
Total			152,613	11,393	8,729	1,600	1,635
Total			201,972	19,830	15,625	2,391	2,181

Table 2.--Numbers of teal permits issued to applicants, percent of hunters, and percent active hunters successful during the experimental September teal season, 1965

State	Permits issued applicants	Percent of hunters	Percent of hunters successful
Central Flyway			
North Dakota	1,714	65	95
South Dakota	7,100	79	93
Wyoming	587	55	66
Nebraska	6,995	69	68
Colorado	3,938	52	48
Kansas	11,275	58	62
New Mexico	810	42	37
Oklahoma	3,997	47	46
Texas	12,943	38	42
Total	49,359	56	65
Mississippi Flyway			
Minnesota	55,000	67	81
Michigan	7,287	64	58
Iowa	17,018	68	72
Illinois	9,061	64	57
Indiana	2,267	60	47
Ohio	2,294	59	53
Missouri	9,970	53	54
Kentucky	843	44	30
Arkansas	5,226	25	44
Louisiana	41,415	31	71
Mississippi	2,232	29	29
Total	152,613	54	71
Total flyways	201,972	55	70

Table 3.--Days hunted and ducks bagged during the experimental September teal season, 1965[1/]

State	Average days hunted per --			Average ducks bagged per --		
	Applicants	Hunters	Total	Applicants	Hunters	Total[2/]
Central Flyway						
North Dakota	1.71	2.63	2,920	4.89	7.50	8,380 ± 6
South Dakota	2.38	3.01	16,880	6.58	8.30	46,690 ± 7
Wyoming	1.40	2.54	820	2.18	3.91	1,280 ± 8
Nebraska	2.11	3.06	14,770	3.21	4.65	22,460 ± 11
Colorado	1.22	2.35	4,790	1.20	2.27	4,720 ± 16
Kansas	1.56	2.69	17,590	2.25	3.91	25,410 ± 14
New Mexico	0.95	2.26	770	0.69	1.64	560 ± 11
Oklahoma	1.16	2.47	4,650	1.06	2.27	4,240 ± 21
Texas	0.86	2.26	11,070	1.01	2.62	13,070 ± 21
Flyway Total	1.50	2.68	74,260	2.57	4.58	126,810 ± 4.9
Mississippi Flyway						
Minnesota	1.24	1.85	68,360	2.75	4.08	151,360 ± 8
Michigan	1.38	2.16	10,060	1.61	2.49	11,700 ± 13
Iowa	1.82	2.68	30,990	2.66	3.88	45,280 ± 10
Illinois	1.68	2.63	15,230	2.00	3.10	18,150 ± 15
Indiana	1.50	2.50	3,400	1.22	2.04	2,770 ± 15
Ohio	1.47	2.49	3,370	1.59	2.67	3,660 ± 13
Missouri	1.34	2.53	13,370	1.73	3.23	17,260 ± 17
Kentucky	1.03	2.34	870	0.51	1.16	430 ± 11
Arkansas	0.58	2.32	3,020	0.67	2.66	3,500 ± 31
Louisiana	0.79	2.55	32,880	1.60	5.20	66,430 ± 20
Mississippi	0.62	2.14	1,370	0.32	1.09	700 ± 27
Flyway Total	1.20	2.22	182,920	2.10	3.90	321,250 ± 6.0
Total	1.27	2.33	257,180	2.22	4.07	448,060 ± 4.5

1/Estimates rounded to the nearest 10.
2/With 95 percent confidence interval shown as a percent; not adjusted for response bias.

Table 4.--Daily hunting success statistics of hunters during the experimental September teal season, 1965

State	Percent of days when-- Unsuccessful	Limit bagged	Percent of kill consisting of fourth duck	Average kill per day
Central Flyway				
North Dakota	9.8	48.2	16.6	2.9
South Dakota	13.0	50.2	18.1	2.8
Wyoming	40.2	21.6	13.4	1.5
Nebraska	43.1	23.8	14.9	1.5
Colorado	58.1	12.6	12.3	1.0
Kansas	42.4	19.7	13.2	1.4
New Mexico	68.5	9.5	13.8	0.7
Oklahoma	62.4	12.1	12.4	0.9
Texas	59.0	21.1	17.3	1.0
Mississippi Flyway				
Minnesota	25.3	35.9	16.4	2.2
Michigan	47.3	13.5	11.3	1.1
Iowa	42.0	19.9	13.2	1.4
Illinois	49.8	17.4	13.6	1.2
Indiana	60.2	7.8	9.3	0.8
Ohio	53.9	13.9	13.1	1.1
Missouri	50.1	20.2	14.8	1.3
Kentucky	75.8	4.8	9.2	0.5
Arkansas	57.0	17.2	15.0	1.1
Louisiana	34.3	32.6	16.9	2.0
Mississippi	74.0	5.0	8.8	0.5

Table 5.--Percent of days hunted each day of the experimental September teal season, 1965, with Saturdays and Sundays shown in parentheses

State	Open season	Day of the season								
		1	2	3	4	5	6	7	8	9
Central Flyway										
	Sept.									
North Dakota	4-12	(24	22)	11	4	3	3	4	(15	14)
South Dakota	4-12	(24	21)	13	5	4	3	4	(13	12)
Wyoming	4-12	(21	17)	11	4	5	6	6	(16	14)
Nebraska	4-12	(20	20)	11	5	5	4	5	(15	13)
Colorado	4-12	(25	20)	10	4	6	5	4	(14	12)
Kansas	11-19	(22	19)	4	4	6	6	6	(17	16)
New Mexico	18-26	(27	18)	4	4	5	5	6	(19	12)
Oklahoma	22-30	11	8	10	(26	21)	7	6	5	6
Texas	4-12	(20	17)	10	4	6	5	7	(19	13)
Mississippi Flyway										
	Sept.									
Minnesota	11-13	(49	39)	13						
Michigan	16-24	26	14	(24	14)	5	4	4	4	5
Iowa	11-19	(29	22)	5	5	5	5	4	(14	12)
Illinois	18-26	(27	20)	5	5	5	5	5	(15	13)
Indiana	10-18	16	(24	0.2)	11	7	9	7	8	(17
Ohio	17-25	20	(22	0.5)	9	7	7	7	8	(18
Missouri	18-26	(22	20)	6	6	6	4	7	(15	14)
Kentucky	18-26	(24	15)	6	5	6	6	9	(19	10)
Arkansas	18-26	(21	17)	9	7	7	6	7	(15	10)
Louisiana	18-26	(23	16)	8	6	6	6	6	(16	13)
Mississippi	18-26	(29	15)	8	4	6	4	6	(19	9)

Table 6.--Percent of ducks bagged each day of the experimental September teal season, 1965, with Saturdays and Sundays shown in parentheses

State	Open season	Day of the season 1	2	3	4	5	6	7	8	9
Central Flyway										
North Dakota	Sept. 4-12	(26	24)	11	3	2	3	3	(15	13)
South Dakota	4-12	(28	22)	13	4	3	3	3	(12	11)
Wyoming	4-12	(20	18)	10	3	4	5	7	(18	16)
Nebraska	4-12	(22	22)	9	4	5	4	5	(17	13)
Colorado	4-12	(23	19)	7	5	5	7	5	(16	14)
Kansas	11-19	(24	18)	5	4	5	5	7	(17	15)
New Mexico	18-26	(23	12)	4	5	8	7	11	(22	9)
Oklahoma	22-30	13	9	9	(25	19)	7	6	5	7
Texas	4-12	(17	18)	9	4	6	4	5	(19	16)
Mississippi Flyway										
Minnesota	Sept. 11-13	(55	35)	10						
Michigan	16-24	40	17	(16	8)	4	5	5	3	4
Iowa	11-19	(38	22)	3	3	4	4	4	(13	10)
Illinois	18-26	(29	19)	4	5	5	6	5	(15	12)
Indiana	10-18	22	(27	0.5)	9	8	9	7	4	(13
Ohio	17-25	25	(20	0.7)	10	7	7	8	7	(15
Missouri	18-26	(22	19)	7	5	6	4	6	(18	13)
Kentucky	18-26	(24	12)	6	4	5	7	12	(22	8)
Arkansas	18-26	(15	17)	12	7	8	6	10	(17	7)
Louisiana	18-26	(23	15)	9	7	7	7	5	(16	12)
Mississippi	18-26	(36	18)	6	3	2	6	2	(19	9)

Table 7.--Average duck bag per active hunter for each day of the experimental September teal season, 1965, with Saturdays and Sundays shown in parentheses

State	Open season	Day of the season								
		1	2	3	4	5	6	7	8	9
Central Flyway										
North Dakota	Sept. 4-12	(3.05	3.01)	2.56	2.09	1.93	2.31	2.19	(2.76	2.54)
South Dakota	4-12	(3.07	2.71)	2.48	2.40	2.28	2.31	1.94	(2.55	2.42)
Wyoming	4-12	(1.46	1.58)	1.38	1.18	1.13	1.38	1.67	(1.78	1.80)
Nebraska	4-12	(1.67	1.67)	1.24	1.20	1.35	1.24	1.43	(1.63	1.45)
Colorado	4-12	(0.92	0.93)	0.66	1.14	0.91	1.41	1.12	(1.17	1.21)
Kansas	11-19	(1.60	1.40)	1.57	1.43	1.15	1.24	1.49	(1.45	1.36)
New Mexico	18-26	(0.66	0.49)	0.63	1.00	1.21	0.97	1.48	(0.91	0.60)
Oklahoma	22-30	1.19	1.06	0.82	(0.89	0.89)	0.93	0.97	0.94	1.11
Texas	4-12	(1.02	1.24)	1.08	1.23	1.28	1.07	0.93	(1.18	1.43)
Mississippi Flyway										
Minnesota	Sept. 11-13	(2.42	1.91)	1.65						
Michigan	16-24	1.80	1.44	(0.81	0.67)	0.94	1.32	1.32	0.82	0.83
Iowa	11-19	(1.88	1.44)	0.80	1.01	1.04	1.26	1.41	(1.26	1.24)
Illinois	18-26	(1.36	1.19)	0.91	1.22	1.29	1.35	1.28	(1.18	1.10)
Indiana	10-18	1.17	(0.92	2.00)	0.70	0.99	0.80	0.73	0.42	(0.62)
Ohio	17-25	1.36	(0.99	1.50)	1.25	1.11	1.00	1.14	1.07	(0.91)
Missouri	18-26	(1.34	1.23)	1.52	1.21	1.25	1.41	1.22	(1.51	1.25)
Kentucky	18-26	(0.50	0.42)	0.56	0.43	0.38	0.62	0.68	(0.57	0.38)
Arkansas	18-26	(0.83	1.14)	1.47	1.17	1.29	1.25	1.52	(1.28	0.85)
Louisiana	18-26	(1.77	1.63)	1.95	1.88	1.94	1.94	1.58	(0.78	0.32)
Mississippi	18-26	(0.69	0.69)	0.39	0.36	0.21	0.80	0.19	(0.57	0.57)

Table 8.--Estimated total retrieved duck kill in the Mississippi and Central Flyways during the experimental September teal season, 1965 1/

State	Blue-winged teal		Green-winged teal		Wood duck		Miscellaneous ducks		Total ducks
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	
Central Flyway									
North Dakota	7,650	91.3	720	8.6	0	0.0	10	0.1	8,380
South Dakota	42,300	90.6	4,250	9.1	50	0.1	50	0.1	46,690
Wyoming	850	66.3	420	32.9	0	0.0	10	0.8	1,280
Nebraska	19,500	86.8	2,780	12.4	160	0.7	40	0.2	22,460
Colorado	3,400	72.1	1,280	27.0	0	0.0	40	0.8	4,720
Kansas	20,920	82.3	4,220	16.6	100	0.4	180	0.7	25,410
New Mexico	450	81.0	100	18.7	0	0.0	T	0.3	560
Oklahoma	3,760	88.6	390	9.2	80	1.8	20	0.4	4,240
Texas	11,610	88.8	1,360	10.4	0	0.0	100	0.8	13,070
Flyway Total	110,430	87.1	15,520	12.2	380	0.3	450	0.4	126,810
Mississippi Flyway									
Minnesota	142,280	94.0	7,870	5.2	910	0.6	150	0.1	151,360
Michigan	8,400	71.8	3,250	27.8	50	0.4	0	0.0	11,700
Iowa	40,530	89.5	4,300	9.5	410	0.9	90	0.2	45,280
Illinois	14,940	82.3	3,100	17.1	110	0.6	0	0.0	18,150
Indiana	2,230	80.3	400	14.6	120	4.5	20	0.6	2,770
Ohio	2,550	69.7	1,060	29.0	50	1.4	0	0.0	3,660
Missouri	15,600	90.4	1,290	7.5	280	1.6	70	0.4	17,260
Kentucky	360	84.0	20	5.0	50	11.0	0	0.0	430
Arkansas	2,990	85.5	240	7.0	270	7.6	0	0.0	3,500
Louisiana	63,770	96.0	2,520	3.8	0	0.0	130	0.2	66,430
Mississippi	620	88.9	10	1.3	70	9.9	0	0.0	700
Flyway Total	294,280	91.6	24,090	7.5	2,310	0.7	460	0.1	321,250
Total	404,710	90.3	39,610	8.8	2,690	0.6	910	0.2	448,060

1/Estimates not adjusted for response bias and are rounded to the nearest 10. Species composition based on wing survey.

Table 9.--Age ratios of teal bagged during the experimental September teal season, 1965

State	Blue-winged teal		Green-winged teal	
	Sample size	Immatures/adult	Sample size	Immatures/adult
Central Flyway				
North Dakota	2,042	6.4	189	1.9
South Dakota	2,455	3.6	254	1.6
Wyoming	456	5.5	237	4.3
Nebraska	1,292	3.4	184	1.7
Colorado	296	4.6	106	1.8
Kansas	731	3.3	146	1.1
New Mexico	290	4.7	65	3.1
Oklahoma	393	3.5	44	2.1
Texas	377	0.9	39	0.9
Flyway weighted		3.02		1.42
Mississippi Flyway				
Minnesota	1,298	2.7	137	2.7
Michigan	343	1.1	133	1.3
Iowa	1,265	2.5	162	2.3
Illinois	855	2.3	70	0.7
Indiana	405	2.6	163	1.1
Ohio	441	2.4	45	3.0
Missouri	573	4.5	14	2.0
Kentucky	231	.9	11	- 1/
Arkansas	130	2.8	16	-
Louisiana	646	1.0	1	-
Mississippi	71	1.4	0	-
Flyway weighted		2.21		1.40

1/Ratio not shown if based on fewer than 20 wings.

Table 10.--Sex ratios of immature teal bagged during the experimental September teal season, 1965

State	Blue-winged teal		Green-winged teal	
	Sample size	Males/female	Sample size	Males/female
Central Flyway				
North Dakota	1,764	1.2	122	0.9
South Dakota	1,919	1.1	152	1.0
Wyoming	384	1.3	188	1.0
Nebraska	999	1.3	111	1.4
Colorado	243	1.2	68	0.8
Kansas	559	1.2	72	1.5
New Mexico	239	1.3	49	1.0
Oklahoma	306	1.2	29	0.9
Texas	181	2.0	18	- 1/
Flyway weighted		1.25		1.22
Mississippi Flyway				
Minnesota	944	1.0	52	0.9
Michigan	183	0.9	75	0.7
Iowa	900	0.9	92	1.0
Illinois	592	0.9	63	1.5
Indiana	292	0.9	35	0.6
Ohio	313	0.9	117	0.9
Missouri	469	1.2	29	1.1
Kentucky	152	1.0	11	-
Arkansas	96	1.2	7	-
Louisiana	162	1.2	2	-
Mississippi	41	1.1	1	-
Flyway weighted		1.00		0.92

1/Ratio not shown if based on fewer than 20 wings.

Table 11.--Sex ratios of adult teal bagged during the experimental September teal season, 1965

State	Blue-winged teal		Green-winged teal	
	Sample size	Males/female	Sample size	Males/female
Central Flyway				
North Dakota	277	0.6	64	1.9
South Dakota	532	0.8	96	1.5
Wyoming	70	1.1	44	0.8
Nebraska	291	1.5	66	4.1
Colorado	52	1.4	38	1.5
Kansas	172	0.8	70	3.7
New Mexico	51	0.5	16	- 1/
Oklahoma	87	0.5	14	-
Texas	196	9.3	21	20.0
Flyway weighted		1.32		2.61
Mississippi Flyway				
Minnesota	354	0.7	20	1.0
Michigan	160	1.1	60	1.9
Iowa	365	1.0	40	1.7
Illinois	263	0.9	95	2.3
Indiana	118	1.3	34	1.6
Ohio	128	1.6	41	1.3
Missouri	104	0.5	15	-
Kentucky	79	1.3	1	-
Arkansas	34	1.6	4	-
Louisiana	170	2.5	14	-
Mississippi	30	1.5	0	-
Flyway weighted		1.11		2.44

1/Ratio not shown if based on fewer than 20 wings.

Table 12.--Incidence of soft primaries in the wings of blue-winged teal bagged in the experimental September teal season, 1965

State	Percent with soft primaries				Sample size			
	A M 1/	A F	I M	I F	A M	A F	I M	I F
Central Flyway								
North Dakota	16.8	47.7	28.7	28.9	95	155	885	743
South Dakota	12.4	52.5	32.0	35.6	226	263	930	868
Wyoming	9.7	24.0	17.6	17.9	31	25	199	151
Nebraska	8.4	35.8	11.4	15.1	155	95	501	398
Colorado	12.0	33.3	8.9	16.7	25	18	124	102
Kansas	1.3	27.0	5.4	4.5	77	89	298	245
New Mexico	-	6.1	0.8	0.0	16	33	132	102
Oklahoma	7.4	9.1	3.2	2.3	27	55	154	129
Texas	0.6	-	2.7	1.8	169	18	111	57
Total	5.9	38.2	18.2	21.5				
Mississippi Flyway								
Minnesota	2.9	26.6	12.1	10.5	139	271	447	468
Michigan	0.0	21.3	8.0	10.6	82	75	87	94
Iowa	1.2	23.4	5.8	4.5	173	175	431	448
Illinois	0.0	7.0	1.1	1.6	118	129	276	304
Indiana	3.2	10.6	2.2	1.7	62	47	138	172
Ohio	1.3	4.3	0.0	0.0	78	47	144	161
Missouri	0.0	6.3	0.4	0.5	35	63	240	214
Kentucky	2.4	3.1	1.4	1.4	42	32	72	69
Arkansas	-	-	0.0	0.0	17	11	48	42
Louisiana	0.0	0.0	1.2	0.0	115	45	85	68
Mississippi	-	-	-	-	18	11	19	18
Total	1.1	20.0	7.6	6.8				

1/ A = adult; I = immature; M = male; F = female

Table 13.--Estimates of the rate of crippling loss (unretrieved kill) and total hunting kill of teal during the experimental September teal season, 1965

State	Mail Questionnaire Survey A: Ducks bagged	Mail Questionnaire Survey B: Ducks lost	Mail Questionnaire Survey C: Ducks lost per ducks bagged (B/A)	Hunter Performance Survey D: Teals bagged	Hunter Performance Survey E: Teals lost	Hunter Performance Survey F: Teals lost per teals bagged (E/D)	G: Total hunting kill factor (C + 1.00)	H: Blue-winged teal bagged	I: Blue-winged teal killed (G x H)	I: Green-winged teal bagged	I: Green-winged teal killed (G x I)
Central Flyway											
North Dakota	8,380	1,920	0.23	173	31	0.18	1.23	7,650	9,410	720	886
South Dakota	46,690	8,460	0.18	279	60	0.22	1.18	42,300	49,914	4,250	5,015
Wyoming	1,280	180	0.14	7	0	0.00	1.14	850	969	420	479
Nebraska	27,460	3,450	0.15	82	25	0.30	1.15	19,500	22,425	2,780	3,197
Colorado	4,720	660	0.14	51	12	0.24	1.14	3,400	3,876	1,280	1,459
Kansas	25,410	3,710	0.15	123	31	0.25	1.15	20,920	24,058	4,220	4,853
New Mexico	560	40	0.07	7	0	0.00	1.07	450	482	100	107
Oklahoma	4,240	470	0.11	12	10	0.83	1.11	3,760	4,174	390	433
Texas	13,070	2,290	0.18	68	9	0.13	1.18	11,610	13,700	1,360	1,605
Flyway total	126,810	21,180	0.17						129,008		18,034
Mississippi Flyway											
Minnesota	151,360	33,330	0.22	325	72	0.22	1.22	142,280	173,582	7,870	9,601
Michigan	11,700	2,030	0.17	87	13	0.15	1.17	8,400	9,828	3,250	3,802
Iowa	45,280	9,410	0.21	222	59	0.27	1.21	40,530	49,041	4,300	5,203
Illinois	18,150	2,760	0.15	27	6	0.22	1.15	14,940	17,181	3,100	3,565
Indiana	2,770	580	0.21	41	9	0.22	1.21	2,230	2,698	400	484
Ohio	3,660	610	0.17	47	13	0.28	1.17	2,550	2,984	1,060	1,240
Missouri	17,260	3,090	0.18	223	62	0.28	1.18	15,000	18,408	1,290	1,522
Kentucky	430	110	0.26	0	0	--	1.26	360	454	20	25
Arkansas	3,500	580	0.16	0	0	--	1.16	2,990	3,468	240	278
Louisiana	66,430	13,250	0.20	152	10	0.07	1.20	63,770	76,524	2,520	3,024
Mississippi	700	80	0.11	12	1	0.08	1.11	620	688	10	11
Flyway total	321,250	65,830	0.20						354,856		28,755
Total	448,060	87,010	0.19						483,864		46,789

Table 14.--Estimated total kill of illegal ducks during the experimental September teal season, 1965

State	Total kill of teals	Hunter Performance Survey: Observations of ducks killed	Hunter Performance Survey: Illegal kill factor	Total kill of teals and illegal ducks	Total kill of illegal ducks
Central Flyway					
North Dakota	10,296	118	1.026	10,564	268
South Dakota	54,929	280	1.061	58,280	3,351
Wyoming	1,448	*	1.093	1,583	135
Nebraska	25,622	127	1.079	27,646	2,024
Colorado	5,335	82	1.093	5,831	496
Kansas	28,911	156	1.147	33,161	4,250
New Mexico	589	*	1.093	644	55
Oklahoma	4,607	*	1.087	5,088	401
Texas	15,305	70	1.078	16,499	1,194
Flyway Total	147,042	833	1.083	159,216	12,174
Mississippi Flyway					
Minnesota	183,183	374	1.045	191,426	8,243
Michigan	13,630	102	1.074	14,639	1,009
Iowa	54,244	288	1.134	61,513	7,269
Illinois	20,746	42	1.077	22,343	1,597
Indiana	3,182	58	1.093	3,478	296
Ohio	4,224	68	1.115	4,710	486
Missouri	19,930	267	1.019	20,309	379
Kentucky	479	*	1.093	524	45
Arkansas	3,746	*	1.019	3,817	71
Louisiana	79,548	123	1.027	81,696	2,148
Mississippi	699	*	1.027	718	19
Flyway Total	383,611	1,322	1.056	405,173	21,562
Total	530,653	2,155	1.064	564,389	33,736

*State had insufficient hunter performance sample, illegal kill factor from observations in neighboring States.

Table 15.--Estimated number of ducks of illegal species killed during the experimental September teal season, 1965

State	Hunter performance observations of illegal ducks killed	Numbers of illegal species of ducks estimated killed based on hunter performance observations													Total illegal kill
		Merganser	Mallard	Black	Mottled	Gadwall	Widgeon	Shoveler	Pintail	Wood duck	Redhead	Canvasback	Ruddy	Unid.	
Central Flyway															
North Dakota	3					89			90				89		268
South Dakota	16		838			418	209	419	210		210	209		838	3,351
Wyoming	*													135	135
Nebraska	1		471			136	202	269	405	471	70				2,024
Colorado	7		412						84						496
Kansas	20		637				425	425	1,062	1,487	214				4,250
New Mexico	*													55	55
Oklahoma	*									401					401
Texas	5				955			239							1,194
Flyway total	51		2,358		955	643	836	1,352	1,851	2,359	494	209	89	1,028	12,174
Mississippi Flyway															
Minnesota	16	514	2,061				1,030			3,610	514			514	8,243
Michigan	7		575				288		146						1,009
Iowa	34		1,890				436	219		4,724					7,269
Illinois	3									1,597					1,597
Indiana	5		59				59		59	59				60	296
Ohio	7		70	69						347					486
Missouri	5		75							304					379
Kentucky	*													45	45
Arkansas	*													71	71
Louisiana	4				2,148										2,148
Mississippi	*													19	19
Flyway total	81	514	4,730	69	2,148		1,813	219	205	10,641	514			709	21,562
Total	132	514	7,088	69	3,103	643	2,649	1,571	2,056	13,000	1,008	209	89	1,737	33,736

*State had insufficient hunter performance sample, illegal kill composition observed in neighboring States used.

Table 16.--Percent of waterfowl hunters in the regular and special seasons desiring to participate in a special teal season, and the ratio of permits issued to stamps purchased.

State	1964-65 waterfowl hunters percent yes	Ratio 1965 teal permits to 1964 duck stamps	1965 teal hunters percent yes
Central Flyway			
Montana	54	--	--
North Dakota	60	.044	86
South Dakota	71	.205	90
Wyoming	75	.103	90
Nebraska	77	.243	95
Colorado	66	.150	91
Kansas	85	.406	93
New Mexico	77	.159	93
Oklahoma	83	.185	95
Texas	77	.155	92
Central total	73	.181	92
Mississippi Flyway			
Minnesota	72	.428	72
Wisconsin	68	--	--
Michigan	68	.092	83
Iowa	80	.452	88
Illinois	74	.170	92
Indiana	72	.134	94
Ohio	70	.091	90
Missouri	78	.261	96
Kentucky	77	.118	92
Arkansas	54	.150	85
Tennessee	58	--	--
Louisiana	88	.481	95
Mississippi	69	.138	88
Alabama	75	--	--
Mississippi total	73	.292	85
Total of flyways	73	.254	87

Table 17.--Comparisons of population estimates, kill, and rates of kill on teal in past years with those for 1965 and the experimental September teal season, 1965

	1955-59 Average	1960-64 Average	1965	1965 experimental September teal hunting season	Estimated total Sept. and regular waterfowl seasons
Blue-winged teal					
Breeding population 1/	6,814,000	5,387,200	4,967,000		
Fall flight 2/	15,672,200	12,390,560	11,424,100		
Central Flyway kill 3/	272,493	42,237		129,008	
Mississippi Flyway kill 3/	344,040	153,120		354,856	
Total U.S. kill 3/	754,222	264,894		483,864	783,864 4/
Rate of kill	.05	.02		.04	.07
Green-winged teal					
Breeding population	3,468,000	2,925,700	2,414,000		
Fall flight 2/	7,977,780	6,729,110	5,552,200		
Central Flyway kill 3/	460,746	147,420		18,034	
Mississippi Flyway kill 3/	383,208	201,120		28,755	
Total U.S. kill 3/	1,248,786	766,003		46,789	846,789 4/
Rate of kill	.16	.11		.01	.15

1/Includes cinnamon teal in western areas.
2/Fall flight = 2.3 x breeding population -- production ratio of 1.3 young per adult was used.
3/Harvest adjusted to total kill with crippling loss rates in table 13; Pacific and Central Flyway blue-winged teal harvest estimates for 1960-64 were reduced to allow for cinnamon teal on the basis of data from 1955-59 when species of ducks bagged was reported on the questionnaire; 1960 data were questionable since cinnamon teal were not on the questionnaire sent to Pacific and Central Flyway hunters.
4/Regular duck hunting season kill of blue-winged teal estimated at 300,000; that of green-winged teal at 800,000.

Appendix A

Common and Scientific Names of Waterfowl Mentioned in this Report

Mallard (Anas platyrhynchos)
Black Duck (Anas rubripes)
Mottled Duck (Anas fulvigula)
Gadwall (Anas strepera)
American Widgeon (Mareca americana)
Green-winged Teal (Anas carolinensis)
Blue-winged Teal (Anas discors)
Cinnamon Teal (Anas cyanoptera)
Shoveler (Spatula clypeata)
Pintail (Anas acuta)
Wood Duck (Aix sponsa)
Redhead (Aythya americana)
Canvasback (Aythya valisineria)
Ruddy Duck (Oxyura jamaicensis)
Pied-billed Grebe (Podilymbus podiceps)